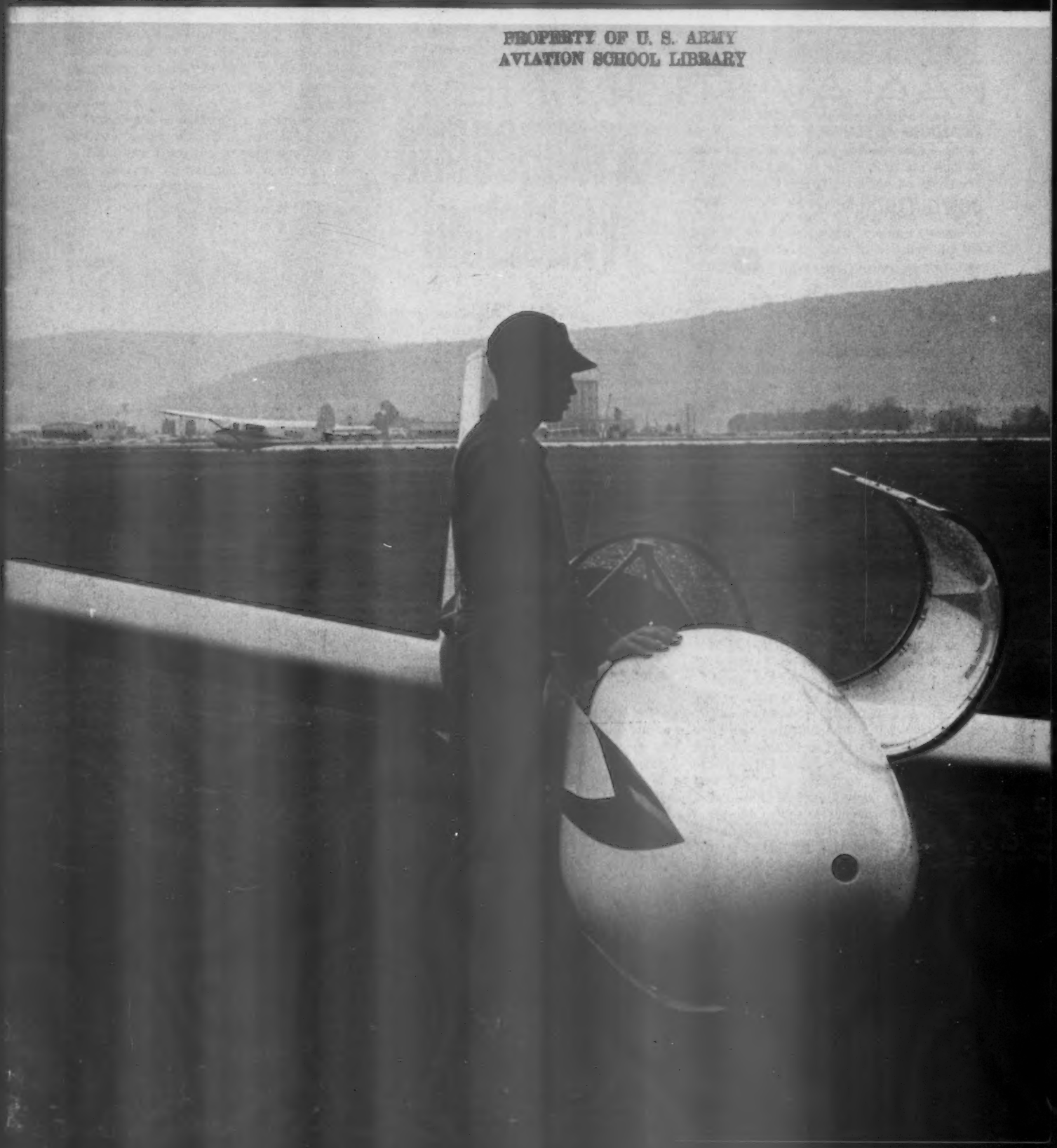
FAA AVIATION NEWS

MAY 1972



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COVER:
For an introduction to the sport of silent wings, see page 8.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION / FEDERAL AVIATION ADMINISTRATION VOL. 11, NO. 1

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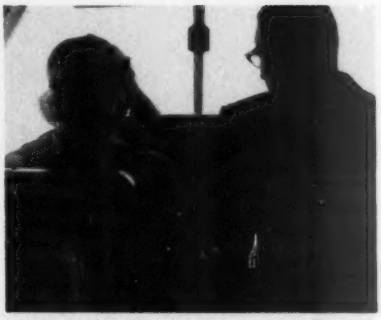

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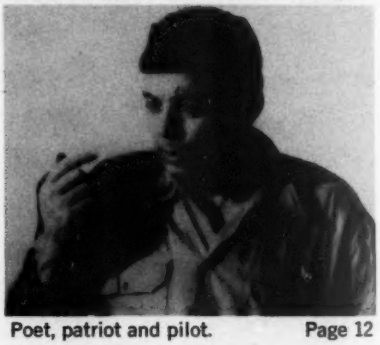

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Most of the 40-foot vertical stabilizer was torn off of this B-52 bomber when it penetrated extreme clear air turbulence deliberately. Crew managed to land safely and salvage test records.

Atmospheric Instability

Turbulence is one of those things everyone hears about, but no one ever sees—which is not surprising because most turbulence is invisible. As the saying goes, you may have to feel it to believe it, and it may come as quite a shock, especially in a light plane with a pilot unaccustomed to aerobatics. Turbulence can literally snatch an aircraft out of control or even cause structural damage. It is a frightening first-time experience, which can best be handled by pilots with some understanding of their invisible enemy.

Turbulence is difficult to describe, forecast or classify. The dictionary definition—"a departure from the smooth flow"—is as good as any. Turbulence is separated into four general categories:

LIGHT: Seat belts are needed, but objects in the aircraft remain at rest.

MODERATE: Seat belts are required and occupants are occasionally thrown against the belts; unsecured objects may move about.

SEVERE: Aircraft may be momentarily out of control; occupants are thrown violently against the belt and back into the seat; objects not secured are tossed about in the aircraft.

EXTREME: A rarely encountered turbulent condition in which the aircraft is violently tossed about, and is practically impossible to control. May cause structural damage.

It must be remembered that aircraft reactions to a given turbulent condition vary according to aircraft size and operational factors, such as airspeed, wing loading, altitude, flight techniques, etc. The turbulence intensity reported, therefore, is that experienced by the pilot in his particular aircraft. The aircraft type should always be identified with reporting turbulence intensity. "Light to moderate" turbulence which may spill a few drops of coffee in a DC-8, may seemingly shake the life out of you in a Tripacer.

Turbulence is classified not only by intensity, but also according to its cause: THERMAL, or CONVECTIVE turbulence is the familiar bumpiness of a summer afternoon, caused by surface heating. Often this thermal turbulence is in the "light" class, and in clear air conditions it normally does not constitute a hazard for light aircraft, except with quite strong surface winds, invasion of very cold air, or where heating of the surface is unusually strong. With any of these conditions, the up and down drafts can be very swift and terminate with savage abruptness.

Although not inherently dangerous, this type of turbulence can be uncomfortable, frighten passengers, and create certain operational problems, such as an erratic and unpredictable glide path during landing. (It is conceivable, also, that familiarity with this type of turbulence could lead a pilot to complacency if he got the idea that this was all there was to turbulence, because there are other types, more serious, with which to be concerned.)

FRONTAL turbulence is associated with weather systems and is a well-publicized hazard to light aircraft, or even to large airliners. While it can be quite severe, it is usually accompanied by storm clouds visible both to the eye and on radar, and is thus more often avoidable, especially by VFR pilots. Recent research indicates, however, that the turbulence associated with a thunderstorm may extend over an even wider area than formerly believed, particularly *ahead* of an advancing storm. Frontal turbulence can be light, moderate, severe or extreme.

MECHANICAL turbulence is created by air flowing over an irregular surface. Where trees, buildings, hills and valleys impede all currents and force them upward, they sometimes create an uncomfortable airplane ride and may be a danger during landing, takeoff and taxiing maneuvers. Most severe is the "mountain wave," an especially vicious form of mechanical turbulence which can cause structural damage or loss of control. On record are winds and gusts strong enough to lift a P-38 15,000 feet with both props feathered, or to tear the vertical stabilizer and rudder from a B-52. This type of turbulence is one of the most hazardous conditions of the atmosphere, and even experienced pilots fear and respect it over all other weather phenomena. (See "Valley High—Mountain Low," FAA AVIATION NEWS, September 1970.)

WIND SHEAR occurs when an air current passes over a cooler body of air. The movement of the warmer air brings about abrupt changes in wind direction and/or speed. This "ragged" zone can be extremely turbulent and dangerous when encountered close to the ground or near airports. In a typical example, night cooling forms a pocket of still, cool air in a valley. In the morning a body of warmer air moves over the valley, and the boundary between the two bodies of air develops wind shear—a potential hazard for any aircraft landing or taking off at an airport in the valley.

Wind shear is also associated with high-level jet streams, but actually it may be present at any level and can occur in either horizontal or vertical directions—or both at once. It may always be suspected when passing through a temperature inversion.

In addition to these natural phenomena pilots must also concern themselves with WAKE TURBULENCE, the man-made problem of horizontal vortices which extend out behind the wingtips of large planes in flight. See FAA AVIATION NEWS, March 1971.

Plan your flight around weather reported as turbulent, no matter how light—or wait. It could become severe by the time you encounter it.

If you can, fly to airports without heavy jet traffic. Stay away from inversions.

There are times, of course, when avoidance is not possible or practical. Turbulence might occur after you are airborne and leave you no choice but to carry on. Under these circumstances, it is vital to observe the *maneuvering speed* of your aircraft (or the *turbulent air penetration speed,* if one is listed for the aircraft) and stay below the upper limit. The slower you fly above stall speed, the less severe the buffeting will be.

If your altitude is critical, of course, you will then be more concerned about stalls and loss of altitude. If you are landing or taking off, you may want to keep your airspeed well above stall until you pass through the areas of reported or suspected turbulence, since the prevention of a stall is all-important in this phase of flight.

You can help others as well when you report turbulence to ground facilities, so that the presence of this invisible demon of the sky can be charted. ■

SAFER SKIES

Proposed Part 61 Revision Seeks Higher Standards for Pilots and Instructors

Virtually every pilot in the United States could be affected by FAA's proposed revision of Federal Aviation Regulation Part 61 concerning pilot training and certification. The broad program of rule changes is intended to upgrade the standard of piloting and to eliminate accidents based on lack of currency or proficiency in the cockpit.

Perhaps the most significant change proposed is that concerned with maintaining an acceptable level of skill. The new rule would require a proficiency flight review of every active pilot by a certificated flight instructor at least once every two years. This would include a review of current flight regulations and procedures. No pilot would be permitted to carry passengers, for hire or otherwise, unless he had at least 24 hours of flight time in the preceding 12 months, or passed an appropriate flight check. Student pilots would need a flight instructor's endorsement at least every 90 days for solo flight.

Although the 40-hour minimum flight time for private pilots would be retained, it is anticipated that the more extensive pilot training called for in the proposal would result in students logging considerably more flight time before applying for a private license.

Greater responsibility is given to flight instructors in the proposal, which would make eligibility for prescribed flight tests subject to instructor approval. In turn, the standards for the instructor's certificate would be upgraded.

Other major points in the proposed revision of FAR Part 61 are:

- A student pilot would be permitted to fly an airplane, without passengers, in furtherance of business. He would not be permitted to act as second pilot in an aircraft where two pilots are mandatory.
- For the private pilot's certificate, a finding by the student's instructor that the applicant is able "to perform safely as a pilot with the rating sought," would be required before the practical flight test could be taken. The actual flight test would include procedures or maneuvers selected by an FAA inspector or designated examiner.
- An applicant for the private pilot or commercial certificate would need to have his logbook endorsed by a qualified instructor indicating that he has the knowledge required for the desired certificate before he could attempt the written examination.
- Training for the private pilot's certificate would include instruction in night flying, use of instruments in conducting simulated emergency climbs and descents, following radar and DF (direction finding) headings, solo experience at tower-equipped airports, and more extended cross country flying.
- Flight time required for a commercial pilot certificate would increase from 200 to 250 hours and would include additional instrument and cross country time as well as 10 hours of training in a complex aircraft (retractable gear, controllable propeller). The instrument rating would be mandatory, except for certain restricted certificates not valid for carrying persons for hire, on any night flight or trip extending beyond 50 nautical miles of the airport. (This would exempt most agricultural applicators.)
- Pilots seeking certification as flight instructors would be trained and recommended by instructors who had been awarded FAA's "Gold Seal," a new certificate; or who have held a flight instructor's certificate for at least 24 months and have given at least 200 hours of flight instruction (80 hours for glider instructors).
- Applicants for the flight instructor rating would need a commercial certificate with an instrument rating, plus aircraft category and class ratings (currently a private pilot with 200 hours of flight time may qualify).
- Applicants for an instrument rating would have to be trained and tested in the use of various landing approach aids, such as VOR, ILS and ADF. Presently, applicants may demonstrate proficiency in any single selected approach aid.

The current proposals would be the first

basic changes in the Federal Aviation Regulations governing pilot and instructor certification and training since the modern standards were introduced in 1938. A compelling need, from the standpoint of safety, for revising and upgrading the rules has been expressed by general aviation aircraft manufacturers, FAA inspectors, fixed base operators and pilots in general. All agree that the complexity of today's aircraft and its operating environment must be matched by a broader range of pilot experience and a greater emphasis on recency of experience.

To determine the present and future needs for effective pilot training, FAA representatives held numerous meetings over the past several years with general aviation groups. All conceded that present airman standards, which rely primarily upon training a student to pass a written test and then demonstrate his ability to perform certain flight maneuvers, are no longer adequate. It was felt that an instructor is in the best position to judge the ability of a student, and that accordingly he should assume full responsibility for both the required ground schooling and the flight training.

Under the proposal every active pilot would have a proficiency flight review at least once every two years. Flight instructors would assume added responsibility in maintaining a high level of pilot skill and currency in the air.

One of the aims of the new concept is to reduce accidents in student solo or cross country training by means of closer supervision by the instructor. The need for an instructor's endorsement before written or flight tests can be taken is also expected to reduce time and effort wasted in examinations for which the student is clearly not prepared.

Increasing instructor responsibility for student training naturally calls for higher standards among instructors, including the commercial (with instrument) certificate, and a higher level, the Gold Seal. The "Gold Seal Instructor" rating recognizes the importance of having instructors trained and qualified by thoroughly experienced flight instructors with a proven record of success in their field. The newly proposed Gold Seal (it is presently an honorary rating) would require, in addition to possession of an instructor's rating for 24 months, one of the following:

(1) Training at least 10 applicants for a pilot certificate, of whom at least 8 out of every 10 have been successful, or at least 20 out of every 25.

(2) Serving as a designated pilot examiner or chief flight instructor of a certificated pilot school for at least 12 consecutive months.

A practical instructor test would still have to be administered by an FAA inspector. It would include instructional performance selected by the inspector.

Gold Seal instructors might also be authorized to carry out other responsibilities within the community, such as accident prevention assistance. Comments are solicited on the need and practicality of using instructors in these and other capacities.

The new program of pilot training also affects ground instruction. The student would have to obtain ground instruction or complete a home study course under the supervision of an instructor.

Although no change in the minimum number of hours of flight time required for the private certificate is contained in the currently proposed changes, FAA is particularly interested in hearing opinions from the aviation community on this subject. Brief answers to the following questions would be helpful:

1. Should a realistic minimum number of hours of aeronautical experience (flight training and instruction) be prescribed in Part 61, or should the International Civil Aviation Organization (ICAO) standard of 40 hours be retained?

2. If you favor a realistic standard, how many hours would be needed under FAA's proposed new standards of training and instruction?

3. If a new minimum standard in excess of 40 hours were to be established, should the use of a pilot ground trainer be permitted to count as instruction time for a portion of the hours required in excess of 40?

4. If your answer to question No. 3 is yes, how much pilot ground trainer time should be permitted to count as part of the required minimum?

Several changes in the proposal that affect glider pilots reflect recommendations of the Soaring Society of America. One would limit the glider pilot certificate to the type of tow in which the holder demonstrated his competency (ground or aero). Another calls for accuracy approaches and landings with the nose of the glider *stopping short of and within 200 feet of a line or mark*. Also under consideration is an earlier proposal to permit glider flight into clouds.

Although FAA strongly supports the program of periodic refresher courses for all flight instructors, it appears that existing facilities may not be able to accommodate all the approximately 34,000 certificated flight instructors for an annual or biennial clinic. Further rulemaking with regard to possible required attendance at such clinics has been deferred until the agency has had more opportunity to discuss the program with sponsors of clinics and to evaluate comments from interested persons on this possible action, together with suggestions regarding frequency of attendance at refresher courses, extent of curriculum, practical review, etc.

A complete list of all currently proposed changes to Part 61 may be found in the Federal Register of March 23, 1972 (Vol. 37, No. 57). Send 20 cents for a copy to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Comments on the proposal (Notice No. 72-9; Docket 11802) should be sent to the FAA Rules Docket, GC-24, 800 Independence Ave., S.W., Washington, D.C. 20591. Deadline for comments is July 21. ■

Flickering Lights and Dizzy Pilots

Vertigo is not necessarily a problem of instrument flying. Similar sensations can be induced by sunshine flashing off of propeller or rotor blades.

In the early 1960's a new phrase began to be used with increasing frequency in connection with unexplained pilot sensations of physical incapability: *flicker vertigo.* This type of vertigo apparently occurred under certain circumstances when pilots were exposed to a flickering or flashing light while flying. Symptoms varied from minor discomfort and lack of visual acuity to extreme nausea, dizziness and cramps—even unconsciousness. Attacks of epilepsy were also attributed to flicker vertigo.

Although most of the complaints originated with military airmen, especially helicopter pilots, FAA's Civil Aeromedical Research Institute (CARI) in Oklahoma City undertook an analysis of the problem, and published a preliminary report in 1966. Experiments were also conducted subsequently by the United States Army Aeromedical Research Unit at Fort Rucker, Alabama, where intensive helicopter training is carried out. These early studies have ascertained that flicker vertigo is a real although infrequent phenomenon and that susceptibility to it varies greatly among individuals (some persons are virtually unaffected). Something was learned about the circumstances which favor the onset of flicker vertigo, and this knowledge can be used to prevent possible aircraft accidents brought on by pilot incapacitation.

Photic stimulation (the stimulation of the nervous system by light) has long been recognized as a means of inducing physical discomfort. According to various legends, the ancient Romans tested slaves who were up for auction by forcing them to stare at a rotating disk with a white spot painted on it. Most experienced no ill effects, but some became violently sick, and these were rejected as being physically inferior.

Modern scientists describe flicker vertigo as an ailment brought about by erratic or intermittent interruption of the ordinary flow of light energy to the optic nerve. This interruption of the neurological process can cause dizziness or more serious illness. While it is true that the type of person who would be most sensitive to flicker vertigo is the epileptic, it is patently not true that such an exposure could bring on epilepsy in persons not already disposed to the disease.

Most persons who are sensitive to flashing light become aware of their sensitivity fairly early in life; the interruption of light by passing telephone poles while riding in a car, for example, disturbs some children, and certain cases of car-sickness may have more to do with flickering light than motion.

Research at CARI has shown that there is a frequency range of flashing lights within which a sensitive person is most likely to be bothered: between 8.5 and 24 flashes per-second. This is well below the flash-per-second rate of airplane propellers in cruise or climb configuration, but within the speed of some aircraft propellers at idle setting, and within the range of virtually all helicopter blades in motion. This explains why flicker vertigo often occurs on the ground, with respect to fixed-wing airplanes, and why it is more common among helicopter pilots than among other airmen.

For persons who feel susceptible to flicker vertigo the following precautions are recommended:

- Plan your flight away from the direction of the sun, and do not stare at the prop. If necessary (should an attack of vertigo occur in flight) alter course immediately to reduce sun reflection on the propeller or rotor blades.
- Wear high quality sunglasses and a broad-billed cap.
- Turn off anti-collision lights when flying in or near clouds or snow (the light reflected intermittently from your rotating beacon can be disturbing).
- Avoid slow or prolonged idling of the engine in sunlight.
- Do not fly when fatigued, anxious, irritated or under medication.

Experiments with painting helicopter rotor blades and even propeller blades black as a means of reducing the reflection of the sun on metal parts have not been significant. Apparently the interruption of the light source is the key factor in producing flicker vertigo, and this may be caused by a dull, black blade as well as by a luminous one. FAA is planning continued research over the next two years, to be conducted at the University of Oklahoma Medical School. ■

Flicker Data

(Highest sensitivity range: 8.5 to 24 flashes per second)

Propeller idling at 1,000 RPM
- Two blades: 34 FPS
- Three blades: 51 FPS

Rotor blades average speed (300 RPM)
- Two blades: 10 FPS
- Three blades: 15 FPS
- Four blades: 30 FPS

Cleared to Go

First in a series of articles on the usages and meaning of air traffic clearances.

"Cleared to . . ." is a signal to go, in air traffic parlance. At controlled airports and in controlled airspace it is the green light to proceed to a given objective. A clearance may involve a simple movement, such as taxiing from a ramp to a runway. At controlled airports, clearance is required of all aircraft departing or arriving. More complicated is the clearance from a Terminal Control Area, or a Special VFR clearance. Most complicated of all are IFR clearances, involving SIDs, STARs, and a jargon intelligible only to the initiated. The purpose of this series is to give all pilots an acquaintanceship with various clearance procedures and some understanding of how they may best be used to advantage. Today's article discusses VFR departure clearances.

At most tower-controlled airports the VFR pilot will begin the clearance procedure by contacting ground control, simply identifying his aircraft, position and intentions—". . . *Sparrowhawk 577 Xray, southbound for Louisville VFR on the ramp at Hangar 3, ready to taxi.*"

The ground controller's reply may be quite simple, telling you to taxi to a given runway, or it may be quite complicated (at a hub), indicating a specific route along various taxiways. Before you fly out of a large, unfamiliar airport it is a good idea to hunt up an airport chart in the operations office. You should recall that taxiways are usually identified by letter, in alphabetical order, whereas runways, of course, are numbered. If you have no idea where to find the taxiway you are told to use, ask for help—do not explore the field on your own.

The ground controller will also give you wind direction and velocity and the altimeter setting, unless the airport has ATIS (Automatic Terminal Information Service) broadcast on a VHF frequency, a VOR or ILS. ATIS provides terminal weather and runway data on tape, frequently updated, with a code name for each version; if the ground controller mentions "Charlie" he is not referring to a golfing companion, he means the latest ATIS tape. You can, of course, shorten the transmission by mentioning that you have "Charlie" (or "Mike" or "Papa") in your original call-up.

When a pilot calls ground control and says that he is ready to taxi, this implies not merely that the engine is running, but that the pilot is fully prepared for the trip. You will not endear yourself to busy tower controllers by asking them what they think your chances are of getting over the mountains before a front moves in.

A clearance should be regarded as an authorization from an air traffic controller intended to assure safe separation between known aircraft in controlled airspace while maintaining the traffic flow. It tells you that there is no traffic or other obstacle known to the controller which would create a hazard. Such hazards may, in fact, exist and become apparent to the pilot in command of the airplane, and his is the final responsibility.

When, for example, the ground controller in the tower cab authorizes an aircraft to taxi to a given runway, this indicates that there are no foreseeable ground movements which would interfere with his progress, which may involve crossing other runways en route. If, however, an aircraft with a defective radio mistakenly roars along one of these runways, you had better be prepared to hold short—the ground controller will advise you as soon as he sees the movement, but you might be in a position to see it sooner. Or the frequency may be in use when he tries to warn you.

The same considerations apply to a clearance for takeoff or landing. You should interpret this to mean that the runway is yours —so far as the controller can tell. He has a fine view in the tower cab, and he has radio communications and in some cases radar to extend his surveillance, but that does not mean he can see everything that is happening at all times. Proceed with the same precautionary outlook you would have if there were no tower to advise you.

Conversely, a clearance is never an order that must be executed. Air Traffic Control, at a busy airport, may occasionally ask you to ". . . expedite your departure if possible" but this should never be taken as a demand that you break off a runup check and pour the coal to the engine. *"Sparrowhawk, 577 Xray, cleared for takeoff!"*—or even ". . . *cleared for immediate takeoff!*" means, Go if you are ready. It can never be used as an excuse for compromising safety. There may be half a dozen jumbo jets lined up behind you, huffing and puffing for the runway, but if you do not like the sound of your engine or the feel of the controls or the look of the gauges, tell the tower you have a delay, or you want to return to the ramp. They will issue taxi guidance.

Incidentally, when ground control clears you to a runway, you are to taxi *up to it* but never on it. Advise the tower on *local control frequency* when you are ready to go and hold short of the runway until he clears you to move onto it. The runway "belongs" to him, not to ground control.

On takeoff, local control will monitor your movement until you are safely airborne. After that, as a VFR aircraft you are on your own. You will be given traffic advisories based on radio reports, visual sighting, and radar if available, within the airport traffic area, but this service should not be interpreted as a separation service or clearance.

Air traffic monitoring is more extensive, of course, when you are flying out of an airport within a Terminal Control Area (TCA). To begin with, your original call-up goes to the clearance delivery position in the tower, instead of to ground control, although you provide essentially the same information about your intentions. You will add the altitude at which you would like to depart the TCA, and this will be either approved or modified. Air traffic control prefers to move VFR traffic out of TCAs at fairly low altitudes, to separate them early from IFR traffic, so if you opt for something in the area of 2,500 feet you are more likely to get approval.

After assigning you a transponder (required equipment in a TCA) code to squawk on departure, clearance delivery will turn you over to ground control and pass along the data on your flight to that position.

Once you are airborne local control will ask you to call departure control on a frequency already given you by clearance delivery. (Incidentally, it is often a convenience to have all frequencies in advance, and they may be obtained from the operations office, the FSS, or the Airman's Information Manual.) The departure controller will monitor your flight on radar until you reach the boundary of the TCA, at which point he will probably remind you to squawk the VFR low altitude code (1200) and announce that "radar service is terminated."

Next issue: Arrival clearances

The Silent Birdmen

There are nearly 11,000 pilots in America who are officially licensed by FAA to fly airplanes which have no engines.

They are members of the growing fleet of *soaring pilots* who maneuver their *sailplanes* gracefully through the air, catching updrafts of wind which can lift them to thousands of feet of altitude and often enable them to achieve flights of hundreds of miles across country.

Early in the history of aviation such airmen were generally called glider pilots, but that term is imprecise, and today they prefer to be called soaring pilots. Technically, *gliding* is the piloting of a powerless aircraft in a steady downward flight, while *soaring* is the utilization of upcurrents of air to increase altitude and maintain flight in a powerless aircraft.

And soaring is precisely what thousands of pilots across the country do each week. There is perhaps no more enthusiastic segment of the aviation community than the soaring pilot, and his vocabulary is filled with words like "ecstasy," "euphoria," and "rapture." These pilots will tell you that soaring is really flying at its best, an experience that calls for skills little known or used by the average airplane "driver" with hundreds of horsepower at his command. They claim that soaring bears the same relation to power flying as sailing does to power boating, and no one can call himself a true seaman unless he has mastered the elements without benefit of a gasoline engine.

Soaring pilots cite three main advantages of soaring over powered flight:

1. The unparalleled thrill of sailing smoothly and silently through the air, like a graceful bird playing with the wind. Power pilots are frequently astonished by the fact that a soaring instructor and his trainee are able to converse in the same tone of voice they would use in their living room: "The silence is beautiful."

2. The opportunity to sharpen flying skills and gain a greater understanding of aerodynamics. About two-thirds of all licensed soaring pilots in America also hold regular power tickets, and many claim that they are much safer pilots for having learned how to fly without power.

3. Clear skies. In this age of environmental concern, soaring does no damage to the ecology, since there are no engines to create noise or spill pollutants into the atmosphere.

To those who question the "value" of soaring, enthusiasts reply that it is an excellent and relatively inexpensive means of learning to fly and retaining proficiency, and that it is a far more healthful sport than powered flight, with its great dependence on electronics and push-button controls.

Yes, but is it safe? To anyone customarily dependent upon a conventional airplane, the absence of an engine suggests a potential heap of debris and possibly a trip to the hospital. Latest figures published by the National Transportation Safety Board (for 1969) show only 47 sailplane accidents reported in that year, with four deaths. This could be compared with nearly 4,000 single-engine airplane accidents. However, the accident rate for the latter was 20.04 per 100,000 hours. For sailplanes the rate was considerably higher: 35.45. While there are segments of general aviation with still higher accident rates, it is evident that there are certain hazards associated with the sport of soaring which might be minimized when properly understood.

The historical records of powerless flight are littered, figuratively, with the bones of amateur airmen who persisted in efforts to "fly like a bird" with very little understanding of aerodynamics or meteorology. In 19th century America there was hardly a rural community in the country where some ambitious farmboy had not launched himself from a barn eave strapped to some fantastic contraption of feathers and paper wings.

In the 1870's Otto Lilienthal was successfully flying gliders in Germany. His early designs employed a wooden framework covered with a tough cotton fabric, and the pilot flew with his body hanging in the air, much like a bird-man with gigantic wings attached to his body. (A similar type of "hang gliding" is still practiced, notably on the West Coast, but it can be a dangerous sport when done by amateurs.) In 1896, Octave Chanute, who was then 64 years of age, started producing gliders for use in America. His gliders were equipped with a rudder and articulated wings, and he recorded 2,000 consecutive glider flights without an accident.

In the earliest gliding experiments, the pilot would launch himself by running down the slope of a cliff until he became airborne, much like a kite. The flight usually terminated when the glider reached the valley below. Later, the pilots began to use launching crews who ran into the wind with tow ropes attached to the glider.

The Wright brothers made their first glider flight in 1900, with the pilot lying prone on the lower wing. In 1902, they constructed a more sophisticated glider which gave the pilot complete control by combining the "horizontal rudder" (elevator) with an adjustable vertical rudder. In September and October of that year, the Wrights made nearly 1,000 glider flights, several of which were for more than 600 feet in distance.

In January of 1903, Orville Wright remained aloft for one and one-tenth minutes in his glider, and many historicans claim that he is the first pilot to actually "soar," utilizing the updrafts that beat against the 100-foot Kill Devil Hill.

...n after their historic flights with powered aircraft, the Wrights returned to gliding. In 1911, Wilbur wanted to do further testing of his theories of aerodynamics, and the brothers began a new series of gliding experiments. In that same year, Wilbur remained aloft on one glider flight for nine minutes and 45 seconds, and that remained the world record until it was bettered by W. B. Klemperer, who remained aloft for 13 minutes in the Rhine Valley of Germany in August of 1921.

Sophisticated gliding, or soaring, was developed in the 1920's in Germany. The Versailles Treaty forbade the Germans to construct any powered aircraft, but there was a new generation of students, as well as the pilots back from the war, who wanted to be part of the growing aviation age. They turned to gliding with enthusiasm and ingenuity. In that epoch, pilots remained aloft chiefly by using the upslope winds on the windward side of a ridge. Meteorological conditions in the Rhine Valley provided an unusual amount of upward air currents, and it became the favorite spot for gliders. World records in distance and altitude were made and broken repeatedly.

The modern epoch of gliding was inaugurated by the discovery of the "thermal principle" in soaring in 1930 by a German, Wolf Hirth. A thermal is a rising column of warm air resulting from the unequal heating of the earth's surface by the sun. For example, when the sun beams down on a forest and an open field, the ground on the open field becomes hotter than the forest land. The air over the open field becomes hotter than the surrounding air; it expands, becomes lighter, and rises. These thermals, or heated columns of air, may rise for thousands of feet and extend for as much as 500 feet in diameter. Airman Hirth discovered that he could ride his plane in an ascending spiral up to the top of a thermal and then glide off to the next nearest rising column of air and repeat the ascent, thus remaining aloft for a good part of the day (thermals, naturally, died away at sundown).

The Longest Flight

The great advantage of using thermals, which are found almost everywhere, is that this technique enables pilots to engage in long cross-country flights instead of being confined to the area along the face of a cliff. At present, Wallace Scott, Odessa, Tex., and Ben Greene, Elizabethtown, N.C., jointly hold the record for the longest sailplane flight: 716.9 miles, set in 1970.

Soaring became increasingly popular in the United States in the 1930's, with the first major center located at Elmira, N.Y. The sport has since spread over the entire country, with about 100 soaring schools in existence and 300 local soaring clubs. A national organization, the Soaring Society of America, is located in Los Angeles and serves as the American representative of the Federation Aeronautique Internationale.

Another soaring technique uses "mountain waves," ripples of air over the *lee* side of high mountain ranges. Wave soaring has made possible record flights to extraordinary heights. An ascent by Paul Bikle of Lancaster, Calif., in 1961 to an altitude of 46,267 feet over the Sierra Nevada Mountains is still the world record. Actually the uplift of such waves frequently goes much higher—just how high is not known, since it would not be safe to venture higher even with oxygen, in an unpressurized cockpit.

Cruising speeds for sailplanes range from about 60 to 75 mph. The current world speed record of 96.3 mph around a triangular course was established in 1970 by Walter Neubert, a West German.

CONSTRUCTION. Traditionally, gliders have been built of wood and fabric, but the modern sailplane uses fiberglas, or light steel framing with an aluminum skin. The wingspans are wide, sometimes as much as 55 to 60 feet, with a fuselage about one-third of the wing. There is usually a single main landing wheel, with small auxiliary wheels at each wingtip. Empty weight is about 400 pounds for a single-seater; about 650 for a two-seater.

Controls are similar to that of a power plane, although fewer: control stick for ailerons and elevator, rudder pedals and spoiler/speed brake or flap control. Standard instruments consist of a variometer (for registering the vertical movement of air), altimeter, airspeed indicator, a ball slip-skid indicator, and compass. Radios (self-powered) may be added, if you feel the need for communication, and portable oxygen if you intend to overclimb the eagles. The basic cost of a sailplane is between $5,000 and $10,000 new. Home-construction kits are also on the market, which can cut the costs to half or less.

The performance index of a sailplane is known as its L/D—the ratio between lift and drag. This is determined by the maximum distance the craft will glide in still air at its best gliding speed, per given unit of altitude loss. An L/D of 28 to 1 means that a sailplane sinks one foot of altitude for every 28 feet of glide. L/D ratios of between 20 to 1 and 28 to 1 are common to medium performance planes. Anything over 28 to 1 indicates high performance, with sensitive handling characteristics that should be left only to the well experienced soaring pilot.

PILOT CERTIFICATION. A certificated (private pilot or better) power pilot can add a gliding rating quite simply. All he needs is two hours of flight instruction, at least 10 solo flights in which he has made 360° turns, and a final flight test given by an FAA inspector or designated examiner.

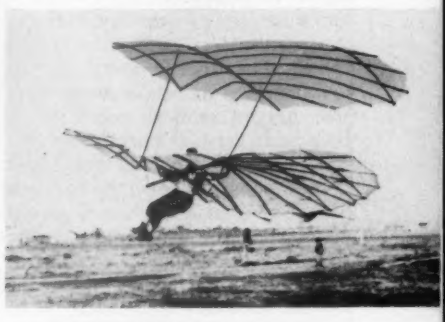
The requirements are more stringent for a non-airman, but they are still much simpler than those required for power certification. No physical examination is needed, only a statement by the applicant that he has no known physical defects which would make him unable to pilot a glider. A student license may be obtained at age 14, following basic instruction—including stall recovery, solo proficiency (involving about 20 to 30 instructional flights) and a written test.

A private pilot certificate (glider) can be obtained at age 16, on the basis of: 100 glider flights (50 flights if they encompass 10 hours of flight time, or 30 flights if all involved aerial tow), an hour of instruction in stall recovery, and passage of a written and flight examination. Soaring schools offer complete transitional courses for power pilots for about $200, and complete courses for non-airmen for about $500.

The modern sailplane is usually borne aloft by a tow plane, a light single-engine aircraft, to one or two thousand feet. At the desired altitude the glider pilot releases the tow line, and is on his own. (The line is dropped near the airfield by the tow plane pilot prior to landing.) Alternate methods of launch are towing by automobile, or by a fixed position winch. The launch is a critical phase of flight, since the soaring pilot must be alert to the possibility of tow line failure or power failure in the towing source. Once he pulls the knob that casts him free, it is strictly a matter between him and the elements.

(Editor's note: The second part of this article will discuss techniques of flying sailplanes and the safety hazards involved.)

Left—Orville Wright was apparently the first pilot to "soar" when he used the updrafts at Kill Devil Hill to remain aloft in his glider for one minute, six seconds in 1903. Right—the gliders flown by Otto Lilienthal in Germany a hundred years ago were actually "hang gliders."



In your nightmare you in your "trusty twin" are groping for the airport in thick, low-lying clouds. You recall that the ILS is located somewhere on the opposite side of the field on Runway 36, and you wonder, with your fuel tanks showing alarmingly low, whether you can possibly make it to the localizer, or whether you'd better drop down where you are. While you hesitate, the Voice in the Tower calmly informs you that you are cleared for an instrument approach to Runway 15, at a slight angle to your left; you twirl a few knobs and you are locked on to a course which gives you distance and direction to the runway plus altitude, and which brings you down through the cloud layer at 500 feet, a half mile from the threshold. . . .

MLS: The Beautiful Dream

Microwave landing systems will make possible precision approaches at many more airports.

The name of this beautiful dream is MLS, a term you will be hearing more and more about in the future. It stands for Microwave Landing System, the FAA-managed national program that will eventually replace the existing VHF/UHF instrument landing system with one employing advanced electronic technology designed to provide the safest, most accurate radio guidance possible for landing an aircraft.

The MLS concept fills a long-standing need for greater efficiency and safety in air terminal operations. It overcomes many limitations of existing instrument landing systems and adds new dimensions of accuracy, flexibility and all-weather capability. It is being developed as a universal system, capable of meeting the needs of all users—U. S. and foreign, civilian and military, commercial and general aviation—at least until the year 2000.

In general principle, MLS is similar to the current VHF/UHF instrument landing system. Ground transmitting stations in the terminal area send electromagnetic signals to the approaching airplane. Received and processed by special airborne equipment, the signals provide azimuth, elevation and range information which is translated into cockpit display and may also be fed into automatic flight control systems.

The fundamental difference between the two systems is in signal wavelength. A microwave is by definition an electromagnetic wave of extremely high frequency. Where ILS operates in the VHF/UHF bands of the spectrum, MLS utilizes waves of much higher frequency (about 50 times higher) with a number of attendant advantages.

For example, ILS radiates a very broad signal pattern that is subject to undesirable environmental influences; trees, hangars and other airport buildings, overflying or parked aircraft, all serve as signal reflectors, distorting the ILS pattern. The higher frequencies of MLS permit focusing the energy in a narrow beam, which contacts a much smaller segment of the environment, reducing environmental interference. MLS thus offers signal quality far beyond the capabilities of the most advanced type of ILS. Additionally, the microwave signal will scan through very wide angles, affording new latitude in the number and types of approach and landing patterns that can be generated. Specifically, the MLS concept offers these potentials:

- Greater dependability. By virtue of its insensitivity to environmental influences, it provides high-integrity, extremely precise signals and permits all-weather operations at a greater-than-ever degree of safety. The ultimate goal of Category III zero-zero landings—which can be achieved by augmented ILS systems at *some but not all terminals*—will become attainable.
- Noise abatement. Where ILS is limited to a single approach path, MLS will provide multiple paths, segmented or curved as well as straight-in, and with varying glide angles. This flexibility offers a number of advantages; for example, more efficient noise abatement through better distribution of traffic.
- Reduced delays. Instrument landings in current systems are often limited not only by runway capacity but also by the necessity of mixing slow and fast planes in a single-file path. With a variety of approach paths (both horizontally and vertically) planes could be sequenced more efficiently, minimizing delays and enhancing capacity. MLS precision and flexibility will provide a further boost to capacity by making it possible to install systems on parallel runways with less separation than that needed by existing ILS.
- Low cost compatibility. A low-cost general aviation version will be economical even at low-density airports where traffic does not justify installation of existing systems. Because of microwave insensitivity to the environment, expensive site preparation will not be needed. The aircraft owner who chooses to equip for MLS will not have to buy costly airline type airborne equipment; he can select the kind of service his type of flying warrants and pay accordingly, and he can fly into the most sophisticated air terminal and get guidance services compatible with the "box" in his airplane.
- Special use. MLS will accommodate the special needs of a variety of unconventional forms of flight activity; for example, current and future V/STOL aircraft and helicopters, tactical military operations at unimproved forward area bases or landings on aircraft

carriers or at difficult civil airport sites.

• Common use. The common (civil/military) signal format will make it possible for any properly equipped airplane to utilize the terminal guidance services at any airport. This is particularly important in view of a trend toward greater civil-military joint use of airports; the high cost of new airports, together with public resistance on environmental grounds, has directed attention to the need for better utilization of existing facilities.

As presently viewed, there will be at least three choices of airborne equipment. A simple general aviation "box" will indicate range, azimuth and glide slope correction. A middle performance package will add the capability of the pilot selecting azimuth and glide slope angles for increased approach flexibility. The full perfromance package will add the capability of flying special approach paths such as segmented or curved horizontal and vertical paths for complete all-weather approach and landing operations. Compatibility will be complete; i.e., the simplest MLS airborne equipment will be able to use the most sophisticated MLS ground installation (within the limitations of the receiver), and the most complete airborne package will be able to use the simplest ground facility.

Cost estimates are still premature, but it is expected that a microwave receiver set will be priced eventually in the same range as existing VHF/UHF receivers.

MLS as a universal system is new, but the concept dates back to 1946 when the Air Force first tested a microwave landing system. FAA began exploring the microwave potential in 1959. In the mid-sixties FAA developed a microwave scanning beam system called AILS (Advanced Integrated Landing System) and more recently conducted a program designed to meet V/STOL requirements. FAA is currently testing both systems. FAA's efforts also provided the basis for a number of military developments, some of which are now in use or undergoing evaluation.

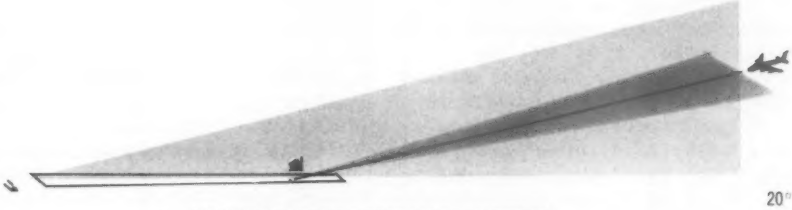
The common-use MLS had its genesis in 1967 when the U.S. airlines indicated their need for a completely new landing system. This led to the formation, at year-end 1967, of a special committee of the Radio Technical Commission for Aeronautics. This group of government and industry experts worked more than two years to produce the recommended system concept which formed the basis for the National Plan for Development, now part of a combined DOT (FAA), DOD and NASA program.

Throughout the development program coordination will be maintained with interested groups such as RTCA, Aircraft Owners and Pilots Association, Air Line Pilots Association, Air Transport Association, International Civil Aviation Organization and the North Atlantic Treaty Organization.

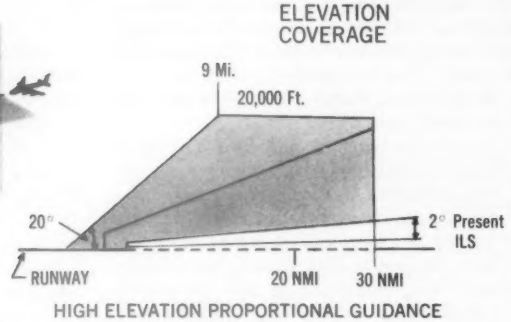
MLS is in developmental infancy. The project began last year with preparation of six proposals by a number of industry teams, six of which were awarded contracts for technique analysis and contract definition early this year. Through feasibility demonstrations and prototype evaluation various approaches will be narrowed down to the one best design. Production will begin in 1977 and a limited number of microwave landing systems will be operational in 1978, according to the National Plan.

Whenever the first operational usage of MLS comes, it will not achieve sudden universality; the transition will be gradual. FAA will continue to install conventional ILS systems for several years and these will operate for years thereafter. So the transition is not a matter of turning off all existing systems one day and starting MLS the next. MLS will probably be installed first at terminals where ILS cannot provide the service required, such as at STOLport sites, followed by systems to satisfy Category III needs, then gradually expand over a period of years until eventually—assuming foreign acceptance—it replaces the existing ILS as the ICAO standard system. ■

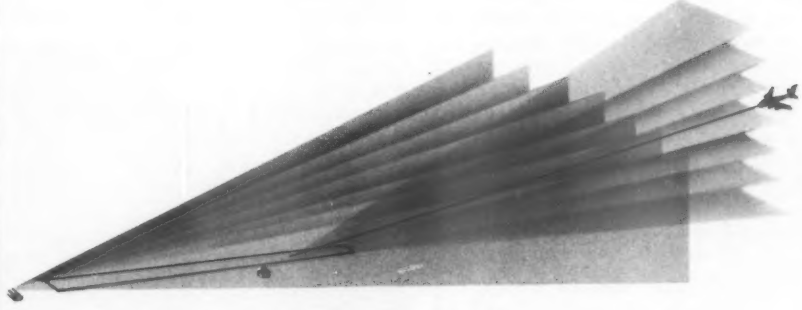
Charts illustrate the expanded coverage, both vertically and horizontally, of the microwave landing system as compared to the conventional ILS.



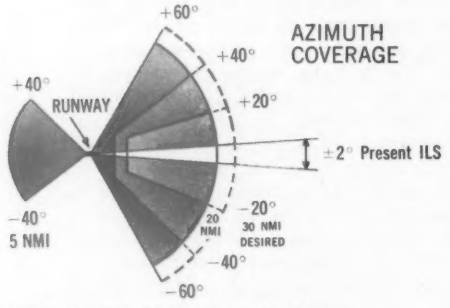
INSTRUMENT LANDING SYSTEM



HIGH ELEVATION PROPORTIONAL GUIDANCE



MICROWAVE SYSTEM



WIDE ANGLE PROPORTIONAL GUIDANCE

Famous
FLYERS

Even starting the big 300 hp engine of the *Breguet* 14 (above) required skill, patience and some helping hands. Right—well above the age limit for fighter pilots, St. X got special permission to fly reconnaissance missions in the P-38 *Lightning* in WW II.

St. X

The desert pilot who gained immortality through his flights of fantasy.

The fame of many an aviator has endured not only because of the magnitude of his exploits but also because of the appeal of the books he wrote, or which were written about him. Lindbergh's *We*, Byrd's *Little America*, and Amelia Earhart's *Last Flight*, for example, are classics of the aviation scene. One pilot has the unique distinction of being famous as a literary genius as well as a pioneer aviator. As Conrad romanticized the age of sail and steam in rather livid, unforgettable prose, so Antoine de Saint-Exupéry transmuted the challenge and the fear, the excitement and the boredom, the danger and the discomfort of early airmail flying in Africa and South America into a literary experience that has kindled the imagination of millions.

Saint X, as he was called by friends, was a Frenchman born at the dawn of the century of flight—on June 29, 1900, at Lyon, France. The son of an aristocrat turned insurance man, he grew up hero-worshipping the pilot aces of World War I, bemoaning the fate that made him too young to fly in that war. When he came of age for military service, he did manage to get himself assigned to the Air Branch of the French Army, but had to mark time as a groundling until a spate of private flying lessons enabled him to qualify for his military wings.

After completing his military service, and with no interesting war on the horizon, Saint X drifted restlessly from one occupation to another. Now a tall, broad-shouldered young man of 23, with brown eyes and a turned-up nose, he exhibited little interest in business affairs and affected a casual, almost sloppy appearance. Though he gave the impression of being distant and reserved, a kind of loner, he delighted in amusing friends with anecdotal stories and comic drawings.

After three years of odd jobs and much dabbling in undistinguished prose and poetry, Saint X returned to flying as a pilot with a small airline, *Aérpostal*, formed by Pierre Latecoerie to carry mail. Based at Toulouse, he flew the route that passed over Spain, crossed the Mediterranean and terminated in Casablanca, carrying an occasional passenger as well as mail. The aircraft were single-engine *Breguets*, with a massive 300 hp engine that achieved a cruise speed of 80 mph. The raucous engine vibrated so viciously that pilots carried a spare altimeter tied to their harness.

The rigors of flight in primitive craft stimulated the "Saint" as no occupation on earth could do. Normally disinterested in geography or mathematics, he became adept in both subjects once his life depended upon his ability to recognize tiny streams and hilltops or calculate kilometers against liters of fuel.

The challenges increased when he was transferred to a base in Morocco, where he flew the mail, day and night, over the seemingly endless Sahara. Here every mail plane was followed by an escort plane, as insurance against the risks of a forced landing on the trackless wasteland where heat, thirst, hunger or the bullet of a marauding tribesman could make short work of a solitary airman.

His experiences over the Sahara in a period of scant or non-existent radio navigation stirred his imagination and gave rise to a book that was to become a classic among airmen: *Wind, Sand and Stars*. In the solitude of the cockpit at night, he would ponder over the tricks of fantasy the mind played upon the pilot. Watching a mountain peak in the distance, he mused:

*". . . if the pilot flies blind, has bad luck correcting his drift, is dubious about his position, that peak begins to stir with a strange life and its threat fills the breadth of the night sky in the same way as a single mine, drifting at the will of the current, can render the whole of the ocean a danger."**

Saint X was one of the earliest to describe the effects of a downdraft on an airplane:

*"Down currents sometimes fill pilots with a strange uneasiness. The engine runs on, but the ship seems to be sinking. You jockey to hold your altitude: the ship loses speed and goes mushy. And still you sink. So you give it up, afraid that you may have jockeyed too much; and you let yourself drift to right or left, striving to put at your back a favorable peak . . . off which the winds rebound as off a springboard. And yet you go on sinking. The whole sky seems to be coming down on you. You begin to feel like the victim of a cosmic accident. . . ."**

In 1929 Antoine de Saint-Exupéry was placed in charge of a small group of daredevil pilots who flew the first regularly scheduled night airmail line in South America, between Buenos Aires and Pategonia. A subsequent novel based on this experience, *Night Flight*, earned him a top French literary award, and the book was made into a Hollywood movie starring Clark Gable and Helen Hayes.

Saint-Exupéry returned to France from South America after 15 months, soon after marrying a young lady from San Salvador, Consuelo Gomez Carillo. Although lionized in literary circles in Paris following the success of his books, which made the best seller lists in the United States as well as in France, Saint X continued to fly the airmail in North Africa until 1934, when his company was taken over by *Air France*, which reassigned him to their public relations office. Bored by the lecture circuit he was confined to, he obtained the approval of his employers to compete for the $10,000 prize offered by the French Air Ministry to anyone who could better the existing record flight time between Paris and Saigon (four days, two hours).

Using a Caudron-Renault *Simoun*, a low wing monoplane, and accompanied by a mechanic, Andre Prevot, Saint X flew his first several legs over familiar North African countryside as far as Benghazi. Because the Libyan coast along the approach to Egypt was forbidden territory (owing to the current Abyssinian War), he was forced to fly over the trackless Libyan Plateau, some 600 miles of desert, in pitch darkness, intending to strike the Nile between Alexandria and Cairo. After four hours of flight, at an estimated airspeed of 190 mph, without sighting the river or any glimmer of light on the cloud-covered ground, Saint X headed north hoping to come out over the seacoast. *"I hugged my window, trying to read below me, to discover flares, signs of life. I was a man raking dead ashes, trying in vain to retrieve the*

*flame of life in a hearth."**

Spotting what appeared to be a lighthouse, they dropped down for a closer look, and a moment later crashed into the ground at 170 mph. The plane was demolished, but amazingly neither occupant was seriously injured. But they were lost in the desert.

Four days later, after having struggled more than a hundred miles over endless sand, utterly without food or water, they were found by a camel caravan of Bedouins, revived, and ultimately taken to Cairo.

When World War II broke out in Europe in 1939, Saint-Exupéry was called up as a Air Force reserve officer, having rejected a role in the Government Information Office. After fighting a rearguard action, his Reconnaissance Group was evacuated to Algiers, shortly before France surrendered. Subsequently Saint-Exupéry and his wife joined fellow expatriates in New York, where they agonized over the fate of their country and awaited rescue by the United States. In the meantime, Saint X produced a book on his war experiences, *Pilote de Guerre* (Flight from Arras) and a book for children, *The Little Prince*, a modern fable.

In 1943 Saint-Exupéry returned to North Africa aboard a troop carrier and was officially reinstated in his old squadron, now flying the American P-38 *Lightning*. He was well over the age limit for fighter pilots, but managed to gain permission to fly reconnaissance missions, thanks to the intercession of General Eisenhower.

In the early dawn of July 31, 1944, Antoine de Saint-Exupéry took off on one of these missions from Corsica, headed for his beloved France. He never returned.

If his death seemed quixotic to some, it was nevertheless fully in character.

"To be a man," Saint-Exupéry had written, *"is precisely to be responsible. It is to feel, when setting one stone, that you are contributing to the building of the world."**

* *Wind, Sand and Stars*, by Antoine de Saint-Exupéry, translated by Lewis Galantière, Reynal & Hitchcock, N. Y.

Right—St. X with his mechanic Andre Prevot, and the Caudron-Renault *Simoun* monoplane before the start of their ill-fated attempt to break the Paris-Saigon flight record in 1931.

■ CAUTION VOR USERS. The possibility of an erroneous course indication has been found to exist for some types of airborne VOR receivers when tuned 50 kHz from the ground station frequency. Under certain conditions, harmonics from the ground station may be received and detected by the aircraft's navigation receiver and appear to be usable course information. The station identification may be heard, the flag alarm hidden and a course indication displayed. The course indication will probably be near the 180° radial (from), or its reciprocal 360° (to), and will not vary as the position of the aircraft is changed with respect to the VOR station.

Efforts are being made to eliminate the undesired signal by modification of airborne receivers, and the aviation public will be kept informed. Meanwhile, all pilots using receivers with 50 kHz capability are cautioned to make certain that they are tuned to the proper frequency by a visual check of the frequency selector. Some pilots are disabling the 50 kHz channel capability of their VOR receivers until the problem is known to be corrected.

■ TRANSPO 72 visitors planning to fly to Washington, D.C., for the U.S. International Transportation Exposition at Dulles Airport May 27 to June 4 can obtain flight information (frequencies and airport diagram) from local flight service stations. Planes intending to land at Dulles during the event will need Transpo Control numbers, which should be used along with the aircraft number on initial callup. Pilots requesting these numbers (call 703 471-4830) will receive detailed airport information.

During some flight exhibitions Dulles Airport will be closed about half an hour twice daily. These times will be announced on Dulles ATIS broadcasts and on NOTAMS from surrounding flight service stations. (See FAA AVIATION NEWS, April 1972, for complete details on aircraft parking.)

■ AIRPORT SECURITY. More than 500 of the nation's busiest airports are required to take immediate action to increase security measures as a deterrent to hijacking and sabotage, following enactment of a new security regulation, Part 107 of the Federal Aviation Regulations. The affected airports, identified in the Federal Register issue of March 18, 1972, must act at once to prevent unauthorized persons from entering designated "air operations areas." They must also submit their security programs in writing to FAA for approval within 90 days.

Although the rule is directed to air carrier airports, airport operators are also required to ensure against unauthorized access to operations areas via general aviation and other airport facilities. In some areas FAA is encouraging air taxi operators to tighten security, in view of recent increases in general aviation piracy.

A companion regulation requires all U.S. scheduled air carriers, as well as commercial operators of large aircraft (over 12,500 lbs.) engaging in intrastate scheduled operations to devise a security program to effectively screen passengers, prevent unauthorized access to aircraft, and assure that all baggage is checked in by responsible agents before loading on board the aircraft.

Landing Minimums Cut to 700' Visibility for Cat. III ILS

Air travel moved a step closer toward the all-weather landings with the commissioning of the first operational Category IIIa Instrument Landing System (ILS) in the United States at Dulles International Airport, near Washington, D.C.

Qualified crews of properly equipped airplanes may land with visibility as short as 700 feet. The lowest previous landing minimums have been 1,200 feet visibility with a Category II ILS. (In Category II and all other landing procedures, the pilot must have runway or runway lights in sight at a predetermined altitude to continue the approach.) With a IIIa landing there is no "decision height."

A number of air carriers are in the process of qualifying for Category IIIa operation, which requires stringent standards of airport and ground facilities, airborne systems, training requirements and maintenance.

The Category IIIa equipment under evaluation at Dulles is a solid-state British-made system on two-year loan to FAA by the British Department of Trade and Industry.

New Glide Slope Signal Tested over Rough Terrain

A modified "wave-guide" glide slope antenna now being evaluated by FAA could make instrument landings practical at airports where the terrain interferes with the signals from conventional glide slope equipment.

Preston Glenn Airport at Lynchburg, Va., was selected as the site of a 75-day test of the new antenna because of the varied contours of the surrounding land. Specially equipped FAA flight inspection aircraft will compare the accuracy of signals on approach headings over level ground in one direction, and over irregular hilly terrain in other directions. In addition, the antenna will be raised for tests to simulate the effects of rising and falling tidal water.

The wave-guide antenna is a hollow, rectangular duct, approximately 70 feet high, and is erected in a slightly tilted position so that the signals emitted perpendicularly along its length are radiated at the desired glide slope angle. Unlike the conventional glide slope antenna, which establishes a signal pattern with ground reflections, and needs level ground directly in front of the antennas, the wave-guide antenna forms its pattern independent of the ground, permitting use over unusual terrain. Standard glide slope receivers are used in the aircraft.

The test antenna will not be used to guide regular air traffic on instrument approaches during the experiment, nor will it interfere with signals from the conventional ILS equipment. If final results are favorable the wave-guide antenna will be moved to an airport with ILS siting problems. Westinghouse Electric Company of Baltimore modified the antenna.

Air Traffic Delays Cut in 1971

A dramatic drop in the number of aircraft delays recorded in the National Aviation System last year has been attributed to new air traffic control procedures and hardware (including ARTS III equipment), an effort by the airlines to reschedule flights by leveling out peak-hour periods, and the introduction of the wide-body jets which carry more people with fewer flights.

In 1971 when control towers handled 53.7 million takeoff and landing operations, and centers worked 21.6 million aircraft, delays were down more than 50 percent from the 1970 level, and almost 70 percent from those recorded in 1969. As a result of the improvement, hourly flight quotas at five high density airports have been relaxed. Only Washington National and LaGuardia in New York still have full-time quotas; New York's Kennedy and Chicago's O'Hare have quotas during peak hours, and those at Newark have been suspended completely.

25 kHz Frequency Spacing Proposed

The use of 25 kHz spaced communications channels is being considered by FAA in an effort to alleviate a shortage of frequencies. Proposed regulations would require IFR aircraft to be capable of receiving and transmitting at the 25 kHz spacing by 1977. VFR traffic would need the capability at some high density locations by 1979.

The new frequencies would be first used in enroute sectors at high altitudes, beginning in January 1976. By June 1977 phasing-in would be complete in both the high and low enroute structure. In 1979 use of the new channels would begin at selected control towers and flight service stations.

Under the present 50 kHz spacing there are more than 3,700 discrete "assignments" on 253 ATC channels in the 118.0 to 136.0 band within the U.S. Although more than one assignment per frequency is permitted as long as the stations are sufficiently separated geographically, the inter-frequency crowding is critical in some parts of the country.

Pre-Fab Towers Planned for GA

Some 64 low and medium activity airports will get control towers within the next two years through the use of prefabricated construction methods, which will result in savings of time and money.

Office, training, storage and equipment space will be provided in the tower shafts, which will be 18 feet square and will vary in height with location from 30 to 70 feet, with a hexagonal-shaped cab providing 230 square feet of floor space. The price of the units range from $154,500 to $264,500, including controller consoles, communication equipment, weather instrumentation, navigation aid monitors and all other equipment needed for a VFR (non-radar tower.)

FAA currently operates about 350 control towers in the United States and handles over 50 million takeoffs and landings yearly.

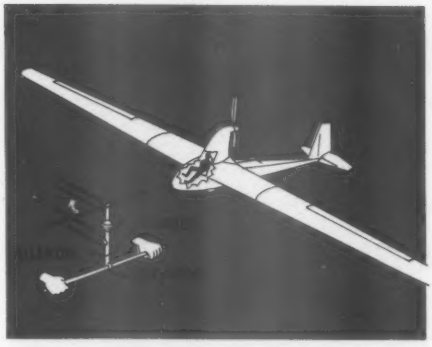
FORUM

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Pedal Powered Puffin

Do you have any information on the bicycle-pedalled flying machines built in England to compete for a prize offered for a flight in a man-powered plane? I believe one of these was called "The Puffin." Was the prize ever won?

Charles P. Ricci
Pompano Beach, Fla.



The Puffin Mk. I *was built by the 32 members of the "Hatfield Man Powered Aircraft Club" (HMPAC) in Hatfield, Herts, England. It was one of several planes in competition for the Henry Kremer £5,000 prize for the first man-powered aircraft flight 10 feet or more above ground, over a mile-long figure eight course. Completed in November 1961 after nearly two years of planning and construction, the craft was named* Puffin *for two reasons: for the deep-chested puffin bird, which it resembled, and for the physical reaction of pilots after trying to fly it.*

Puffin *was by necessity light in weight and wide of wing. Vital statistics were: length, 20 feet; span, 84 feet; height, 9 feet 4 inches; empty weight, 118 lbs! The cockpit was framed by magnesium tubing but the rest of the craft was mostly of balsa wood with a skin of clear plastic. Pedals drove the single bicycle wheel landing gear, and also the prop, which was made of spruce-reinforced balsa, nine feet from tip to tip. The pilot, on a small saddle, controlled the plane with a straight handle-bar, which was pivoted for directional control and rocked for "control in roll." Twisting the starboard hand-grip supplied elevator control. Instruments included a horizon bar, vane-type airspeed indicator, and mass-balanced yaw and pitch vane.*

Puffin *had been airborne 96 times, had flown as far as 993 yards in a straight line, and had (by cheating just a little with a small model engine) made turns through 270° when the craft was seriously damaged in a forced landing in the marshes in April 1963. A later model recently was demolished in a crash landing after flying 500 yards. Apparently the prize money is now £10,000.*

• Where has that magazine gone?

I would like to know why it is that my copy of FAA AVIATION NEWS always arrives after the month of issue. My February issue still hasn't come, and we are already into the second week of March. If the postal service is at fault, why can't you send it out first or second class mail? Some pilot could get himself killed in an air accident, just because the information he needed arrived too late.

Also, what do I do about a copy that never arrives at all?

Beverly Hills,
California

FAA AVIATION NEWS is printed regularly during the third week of the month preceding the month of issue. The February issue, for example, was printed on January 18. Apparently our present delivery system takes about six weeks. With first class mail, the subscription cost would be about doubled. With the current issue we are trying other means of speeding up delivery, which should result in the magazine arriving well within the month of issue.

Subscribers with delivery problems should telephone or write CUSTOMER SERVICE SECTION, P.O. Box 1533, Washington, D.C. 20013. In an emergency, you may seek help from the Editor, FAA AVIATION NEWS, PA-20, DOT/FAA, Washington, D.C. 20951.

• The Silent Majority

In the Pilot Briefs (FAA AVIATION NEWS, November 1971) you state that VOR's might be decommissioned on the basis of radio contacts (6,000 per year).

Counting radio contacts is not the way to check the use of VOR's. In the Midwest VOR's are used extensively for navigation but many times do not require radio contact. On most of my business trips I use the VOR, but unless a weather condition comes I never make radio contact, and according to our fixed base operator many other pilots do the same. We need every VOR we have, but why clutter the airways when it isn't necessary?

George Dudley
Norfolk, Neb.

The purpose of counting VFR radio contacts to flight service stations is not to decommission a VOR but to justify keeping it, in a situation where it is not essential to the IFR system. However the agency will not use this method and is now establishing other criteria for determining the need for a VOR, partially based on existing adjacent NAVAIDS, numbers of airports and based aircraft nearby, plus terrain type.

Enroute position reports have always been encouraged by all branches of FAA, and in no sense of the word are they considered channel congestion. Coupled with flight plans they are a most effective safety procedure, and the safety advantage of their use, versus navigation by VOR without radio reports, is axiomatic. If a plane is lost, the search area is narrowed and the chance for rescue is considerably improved.

A properly placed radio position report is brief, as is the station acknowledgement. You tell who you are, where you are, where you are going, and if you add the frequency you are monitoring it saves a little more radio time by eliminating trial and error responses on various frequencies.

• Traffic Area vs Zone

The article on near-midair collision reports in the December/January issue of FAA AVIATION NEWS stated that one of the changes made due to the information reported was that the "ceiling of the airport control zone was raised from 2,000 feet to 3,000 feet." Obviously you meant *airport traffic area* rather than *control zone*. Please correct this, as it is evident from oral and written exams that there is a lot of confusion between airport traffic areas and control zones among students and higher rated pilots.

John D. Frenzel
Concord, Calif.

Traffic area is correct. Thank you, and others who wrote, for catching the misprint.

• Charter, Lease Regulations

Your June 1971 issue of FAA AVIATION NEWS carried an article entitled "Look Before You Lease," and referred to standards established by FAA in regard to charter or lease of an aircraft. Please advise which publications are available on this subject and how or where they may be obtained.

Jack R. Holland
Santa Barbara, Calif.

The regulations which govern charter or lease of small aircraft are contained in the Federal Aviation Regulations (FARs), Part 135 (Vol. VIII), Air Taxi and Commercial Operators. Charters or leases for large aircraft are governed by FAR Part 121 (Volume VII) which primarily concerns air carrier operations. The FARs are sold in volumes by the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402. The price for Volume VII is $6.50 and for Volume VIII $3.50. The FARs may also be read at FAA field offices as well as at many fixed base operations offices.

• Lady Licensees

How many private, commercial and air transport pilot licenses were issued in the U.S. in 1970 and 1971, and how many of each went to women?

Desmond M. Chorley
Agincourt, Ontario

Statistics for 1971 have not been published, but according to FAA's 1970 booklet, U.S. Civil Airmen Statistics *(available free from DOT/FAA Distribution Unit, TAD 484.3, Washington, D.C. 20591) the following certificates were issued in 1970: private, 53,026; commercial, 21,130; ATR, 3,745. Since these records are not separated by sex there are no figures on how many went to women. However, statistics on the total number of presently active pilots (kept in a different manner) indicate the following figures for 1970:*

	Private	*Commercial*	*ATR*
Total active pilots	203,779	187,871	34,430
Active women pilots	11,409	1,897	79

The fact that feminine interest in flying is growing is borne out by the fact that between 1965 and 1970 the number of licensed women pilots increased from 7,449 to 13,685.

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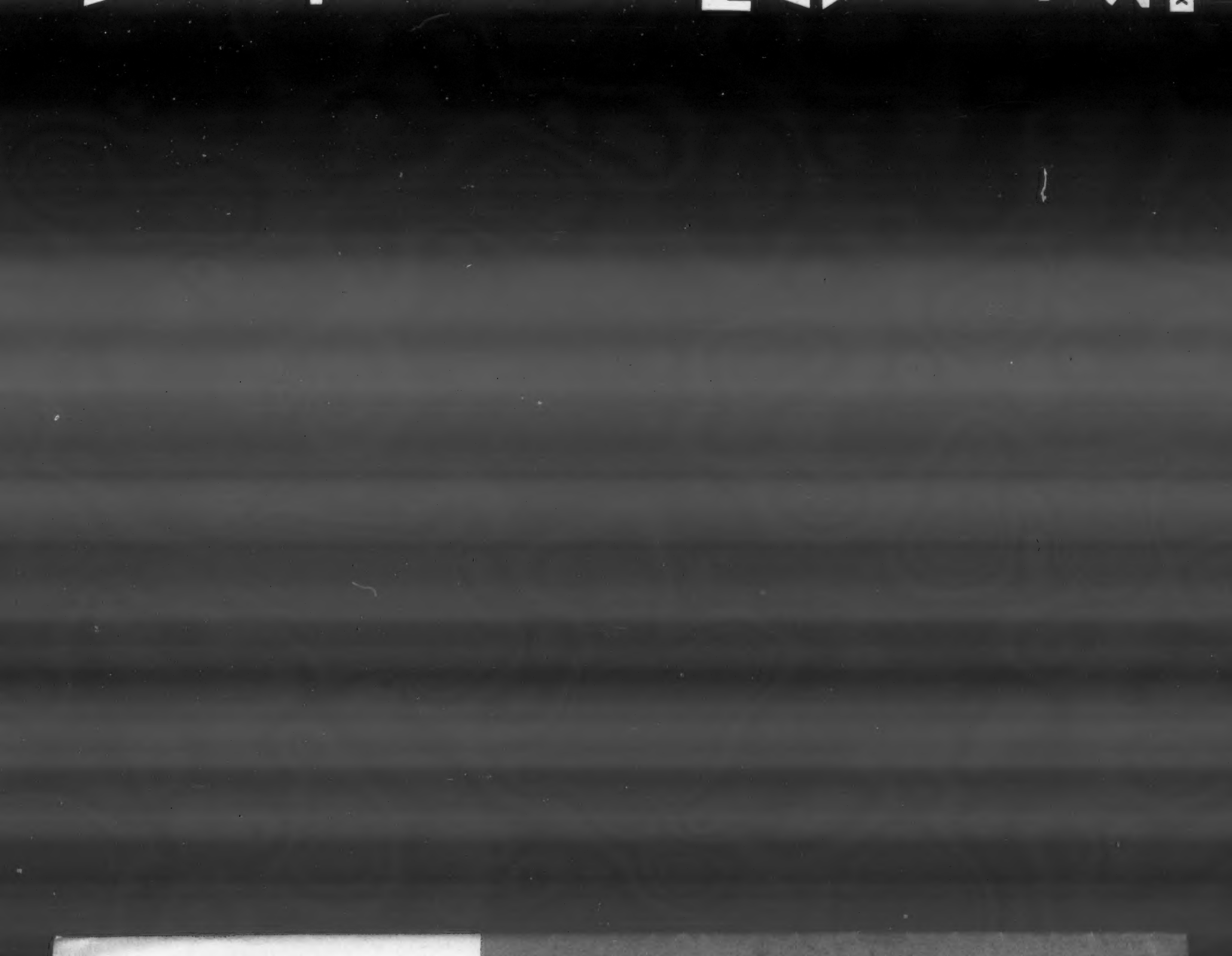
Could keep your plane together